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## THE TEACHING OF MATERIA MEDICA

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### METHODS OF CLASS STUDY

The study of each individual drug in the class room should follow a definite plan. We should begin with the study of the derivation and properties of the substance, its place in the classification and its active principles should then be emphasized. This should be followed by a study of the more important solid and fluid preparations, their care and methods of administration in detail. This should not take up much time, however, leaving most of the period to the study of the pharmacological effects. The period should end with a consideration of the poisonous effects, untoward effects and practical uses.

In the study of the pharmacology of the drugs, I have found the following procedure extremely interesting and practical. It is the application of the inductive method of teaching to materia medica. The pupils are taught to develop from their own experience clinical pictures of the effects produced on actual patients. By the time most of our pupils take up the study of materia medica, they have already had considerable ward experience. They have perhaps already administered many remedies. They have certainly observed the effects of many drugs, although their attention has not been called to any of them. We should take advantage of this experience and thus enable the pupils themselves to develop vivid clinical pictures in plain simple English of patients under the influence of various drugs. For example, in studying the effects of atropine, we begin by inquiring whether any of the pupils have ever seen atropine administered. Invariably there are a number of pupils in the class who have already administered atropine or who have seen it given. The teacher then asks these pupils what effects they had subsequently noticed on these patients. In this way we elicit one action from one pupil and perhaps several other effects from other pupils. The teacher should then summarize all these experiences into one composite picture and compare it with the standard effect. The failure on the part of some of the pupils to have observed certain classical effects should be explained whenever possible.

The nurse will frequently find it difficult to reconcile the effects she

notices on the patient with the action of the drug on certain organs. This should be thoroughly explained and demonstrated. For example, the disappearance of dyspnoea, cyanosis, and oedema in a cardiac case after treatment with digitalis may seem to have no relation to its action on the heart; unless the relation of such effects to heart stimulation are lucidly explained.

#### THE INDUCTIVE METHOD

The advantages of this inductive method of teaching nurses are manifold. First, the nurse is thus taught to observe her patients for the effects of every remedy she administers. Second, her powers of observation are sharpened. This will also be reflected in the improvement of her general observation and nursing care. Third, the effects of the drugs are thus forcibly emphasized on her mind, because they have been learned from her actual experience and the pedagogic value of experience is proverbial. Fourth, the effects of the drugs are learned as visual concepts in the form of clinical pictures. It is well known that visual concepts produce the most vivid and lasting impressions. The pharmacological effects will thus be more easily remembered. Fifth, the method stimulates interest in the subject and in a so-called "dry" subject, like *materia medica*, interest is of paramount importance.

The development of clinical pictures of the various drugs should be followed by a systematic study of the action of each drug on the various organs and tissues of the body. This should be illustrated wherever possible by numerous examples of the practical uses to which each drug is put. The use of many substances in practical medicine for purposes which seem to have no relation to their apparent pharmacological effects, should be clearly explained.

#### THE STUDY OF TOXICOLOGY

The poisonous and untoward effects of drugs should logically follow the consideration of their usual action, for in most instances poisonous effects are merely exaggerated pharmacological effects.

The poisonous effects should be studied in the same practical manner as the pharmacology. Vivid clinical pictures of actual patients in whom poisonous symptoms occur should be developed. The occurrence of each toxic symptom in its proper order should be developed as it is apt to occur in the nurse's routine work. The descriptions of patients with poisonous symptoms should be made as interesting as possible by constantly embellishing such descriptions with the element of human

interest, instances of which frequently occur in actual practice. These will serve to stimulate the interest in the subject and aid the memory.

The discussion of the toxicology of each drug should be followed by an outline of the first-aid treatment from the nurse's standpoint. The lesson should end with a summary of the principal effects of the drug its important preparations, and the methods for their administration.

#### LABORATORY WORK

The value of laboratory work as an aid to teaching is well recognized. The actual performance of experiments has a twofold teaching value. The technical processes which the student must perform and the observation of the changes which are thus induced leave lasting impressions on her mind.

In materia medica the only laboratory work that is essential and practical for the nurse is the technique of preparing and experiments on solutions. This should include not only the methods for calculating and preparing solutions and doses of medicines, but also the study of the principles of physical chemistry and bio-chemistry and their application to nursing. There should also be included in this laboratory work a study of the various types of pharmaceutical preparations as well as the study of the types of active principles, chemical antidotes, etc.

Laboratory work in pharmacology, however, is entirely beyond the scope of the nurse's curriculum. Such a course takes up more time than nurses can devote to it in their limited course. Besides, for such a course it is necessary to equip a laboratory for animal experimentation with the attendant large expense for maintenance, apparatus, etc. Furthermore, such a course requires as a prerequisite, a more extensive knowledge of anatomy, physiology and chemistry than can be taught even in the best training schools. Finally, the pharmacological lessons taught by animal experimentation are of no practical value to the nurse, who should never administer drugs herself, but merely observe their effects and watch for poisonous symptoms.

#### WARD CLINICS

The wards of any general hospital are excellent laboratories for the study of the action of drugs, especially from the nurse's viewpoint. I believe it would be an excellent plan to supplement the course in materia medica as I have outlined it for the second year of training, by a number of ward clinics in pharmacology. The class should be taken through the wards in small groups and the effects of various drugs as they occur

on actual patients should be demonstrated. It should be the aim of the instructor throughout such a clinic to especially train the nurse's power of observation.

#### CLASS DEMONSTRATIONS

A number of important facts in regard to drugs may be advantageously demonstrated to the second year class in materia medica. The demonstration of these facts requires only the very simplest kind of apparatus. The following is a list of experiments which can be readily demonstrated:

1. The action of normal salt solution in maintaining the integrity of the red blood corpuscles. This may be demonstrated in the following way: take three test tubes, fill one with normal salt solution, one with plain water and one with acetic acid solution. To each test tube add three drops of fresh blood taken from the finger. Note the following effects: the test tube containing the normal salt solution becomes cloudy and of a reddish color: the test tube containing plain water has a clear reddish color while the one with acetic acid has a slight precipitate. Microscopic examination of each fluid will show that the red corpuscles in the first tube are normal in shape and size, that in the second tube there are no corpuscles, while in the third tube the corpuscles are smaller and crenated.

2. Demonstrate the neutralization of an acid by an alkali and *vice versa*. Add some sodium hydroxide solution to a test tube containing hydrochloric acid. Note the formation of a precipitate of sodium chloride. Repeat the experiment in a reverse order. The action of lime on oxalic acid may be similarly demonstrated.

3. Demonstrate the neutralization of an alkaloid by tannic acid. Add some old tea to some strychnine sulphate solution in a test tube. Note the formation of a precipitate.

4. Demonstrate astringent action. Break an egg into a dish (let the egg represent a cell). Add some silver nitrate solution to it. Note the coagulation of the proteins.

5. Demonstrate osmosis. Fill a test tube with a sugar solution and cover its mouth with a piece of parchment. Immerse the tube with its parchment cover downward in a beaker containing a salt solution. Note the interchange of fluids by the change in taste of both solutions and by the presence of sugar in both solutions as tested with Fehling's solution.

6. Demonstrate the effect of caffeine on muscle tissue. Place a piece of muscle fiber in a solution of caffeine in the field of a microscope. Note the change in the size, shape, and striations of the muscular fibers.

7. Demonstrate the effects of strychnine. (a) Inject a frog with about gr.  $\frac{1}{30}$  of strychnine sulphate. Note the increase in reflex action, by painting the skin with a dilute acid or sticking it with a pin. Study the development of convulsions and demonstrate their reflex character when they occur. (b) Immerse a frog in a 20 per cent cocaine solution. Inject this frog with a dose of strychnine sulphate. Note the absence of convulsions or their more gradual development. Emphasize the necessity of an external stimulus to induce the convulsions. (c) Decapitate a frog and inject it with a dose of strychnine. Note the occurrence of convulsions, and demonstrate the action on the spinal cord.

Before performing these demonstrations, the relation of the spinal cord to reflex action should be clearly explained. After the above experiments have been completed, the logical steps through which the conclusions are reached should be summarized.

There are a number of other pharmacological demonstrations which may be performed before the class. Most of them are either too elaborate or take up too much time. Those I have described are the simplest and most practical ones.

#### THE CORRELATION OF CLASS AND WARD WORK

For the nurse to obtain the full value of her class work in materia medica, no matter how efficient that may be, it is essential for her class work to coincide in point of time with her practical ward work in the handling of medicines. The pupil nurse may thoroughly comprehend the subject in class but the full force of the instruction will be lost unless she is at the same time handling, administering and observing the effects of the drugs in the wards. In many instances the nurse performs these practical duties either before, or long after the class work. Whenever possible, the nurses who are studying materia medica in class, should be assigned on duty in the medical ward to take charge of and to administer the medicines. In making this statement, however, I am cognizant of the fact that it is frequently difficult to assign every member of the class to such duty. To do so will frequently tax the ingenuity and generalship of even the most experienced superintendent. Nevertheless, I believe that the correlation of class and ward work in materia medica can be accomplished for at least part of the time.

#### THE VALUE OF REVIEWS

Frequent reviews of the class work are invaluable to pupil and teacher alike. They give the pupils a broader aspect of the subject and enable them to summarize and correlate the subjects studied in

class. To the teacher they are an indication of the progress of the class, of the difficulties the pupils encounter, and of their grasp of the subject. The value of reviews depends on their being unexpected and on the character of the questions asked. As a general rule, I believe the unanticipated review is more valuable to both teacher and pupil than the expected one. Expected reviews are apt to indicate merely the amount of preparation. The unanticipated review, on the other hand, indicates the lasting impressions created and the pupil's practical working knowledge of the subject. Naturally, the questions to be asked, especially when the review is not anticipated, should be of a general and practical nature. The answers to such questions should show whether the pupils have been sufficiently impressed with the essential features of the subject. The unexpected reviews will encourage the pupils to study more diligently throughout the course. On the other hand, if the reviews are anticipated, the students will have a tendency to neglect their regular study and will be inclined to postpone most of it to a short time before the day of examination. Thus they are apt to place more importance on passing the examination than on obtaining a working knowledge of the subject.

To propound proper and comprehensive examination questions is quite an art. The examiner should attempt to ask such questions as are of practical importance or those which will serve to demonstrate an essential knowledge of the subject in the answers. The most valuable questions are those on the administration of medicines, on the essential effects of drugs, on their most important preparations, on the early symptoms of poisoning, etc. Questions requiring the solving of practical solution problems, and those dealing with practical problems in the use of drugs or those requiring original thought are always valuable and should be repeatedly asked. It is best to ask questions requiring short concise answers. By a large number of such questions we may cover a good deal of ground in a comparatively short review and thus test the student's broad general knowledge of the subject. Questions that interest the instructor from a broader aspect, or those having only an academic value should be avoided. Those which leave a choice of answers such as, what is the next thing the nurse should do? or, what are the three effects of opium? should also be avoided. The inclusion in an examination of a list of technical terms to be defined has only a limited value.

I have tried to cover, in these articles, the more important problems with which the teacher of materia medica has to deal. I realize that a great deal still remains to be accomplished in this, as in other fields of nursing education. I wish to summarize, however, the points I have tried to emphasize.

## CONCLUSIONS

1. Materia medica is a necessary and important subject of the nursing course.
2. The nurse's function in regard to drugs is to administer them intelligently and to observe their effects.
3. The necessity for a good preliminary education on the part of our pupils.
4. The need of studying anatomy, physiology, and chemistry before taking up materia medica.
5. The need of well-trained and efficient teachers.
6. The feasibility of dividing the course into the following three parts: *a*, A preliminary course, *b*, a course on solutions, *c*, a course on general materia medica and pharmacology.
7. The necessity for the preliminary first year course.
8. The necessity of studying solutions in a well equipped laboratory.
9. The advisability of supplementing the class work with ward clinics.
10. The value of correlating class and ward work.
11. The value of frequent unexpected reviews.

Nursing education is just emerging from its pioneer stage and great credit is due the many noble women who have blazed the way. It is largely due to the efforts of these women that the status of the nurse has markedly improved of late years. The Board of Governors of most of our large hospitals are now beginning to realize that the training school is an important educational factor in the community. They are realizing, too, that an important function of the hospital, perhaps not very remote from that of treating the sick, is the proper training of its nurses. This is a duty they owe to the community from which the hospital largely derives its income. Only by a proper training can the modern nurse demonstrate the ideals of Florence Nightingale and thus help by her self-sacrifice, gentleness and humility, to alleviate the numerous ills of both body and mind.